P-5.1 Analyze the relationships among the properties of waves (including energy, frequency, amplitude, wavelength, period, phase, and speed).

Revised Taxonomy Level 4 Analyze conceptual knowledge

In physical science students

- "Compare the nature and properties of transverse and longitudinal/compressional mechanical waves." (PS-7.2) and
- "Summarize characteristics of waves (including displacement, frequency, period, amplitude, wavelength, and velocity as well as the relationships among these characteristics)." (PS-7.3)
- "Use the formulas $v = f\lambda$ and $v = d/t$ to solve problems related to the velocity of waves." (PS-7.4)

In physics, students will look at these same characteristics but they will now analyze these properties and characteristics. Students will analyze both conceptually and analytically.

It is essential for students to

- Understand both conceptually and analytically the factors that affect the properties of a wave
- Summarize each property and characteristic in terms of
  - The physical effect that each property or characteristic has on the wave
  - The factors which influence each property or characteristic
  - The ways that each property or characteristic is measured
  - The symbol for each property or characteristic and the units that are used to measure it.
  - The mathematical relationship between or among the properties or characteristics
  - The difference between transverse and longitudinal waves.

Assessment

The revised taxonomy verb for this indicator is analyze which means to "break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose". In this case, students should be able to evaluate all of the parts of a wave and address the ways that they influence one another. Because the indicator is written as conceptual knowledge, assessments should require that students understand the "interrelationships among the basic elements within a larger structure that enable them to function together." In this case, assessments must show that students understand the reasons for the ways that the characteristics and properties affect one another both mathematically and physically.